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Abstract

Although there have been a number of studies that have applied the gravity model to migration and tourist flows, analyses covering both international and intranational movements have been scarce. This study, using unique official statistics for accommodation facilities in Japan, empirically analyzes the determinants of both international and intranational tourist flows. According to gravity model estimations, physical distance has a large, negative effect on tourist flows, but the quantitative magnitude of these effects differs little between foreign and domestic (interregional) tourists. The border effect on tourist flows is quantitatively large, and the number of tourists from foreign countries is more than 60% smaller than that from domestic ones. These results suggest that policies mitigating border barriers may contribute to a higher number of foreign tourists.

Keywords: Tourists, Accommodation, Gravity model, Distance, Border effect
JEL Classification: F14, L83

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1. Introduction

International trade in services has been steadily increasing. From 2010 to 2016, annual growth rate of world services exports was 3.8%, while that of goods exports was 0.7%. In Japan, according to the National Accounts (Cabinet Office), annual growth rates of goods and services exports in real terms between 2012 and 2016 were 1.6% and 14.3%, respectively. Among services exports, foreign tourists visiting Japan are increasing rapidly. According to the Japan National Tourism Organization, the number of people visiting Japan from foreign countries rose from 8.36 million in 2012 to 24.04 million in 2016 (**Table 1**), essentially tripling in these four years. Visitors from Asian countries contributed significantly to this rapid growth.

A large number of empirical studies have used gravity model to analyze the effects of distance and national borders on international trade in goods (see Anderson, 2011; and Head and Mayer, 2014, for recent surveys). In contrast, due partly to data limitations, studies applying the gravity model to services trade have lagged. In particular, gravity analysis covering both international and intranational trade in services has been scarce. Using gravity models, many studies have been conducted about migration, tourist flows, and commuting. However, such studies generally focus only on international or domestic interregional flows of individuals. Empirical analyses covering both international and intranational flows are almost nonexistent.

Against this background, using official Japanese statistics for accommodation facilities, this study measures the effects of distance and national borders on tourist flows and makes four primary contributions to the literature. First, the analysis covers both international and domestic interregional tourist flows. Second, it estimates gravity models at the accommodation facility level. Third, it subdivides facilities by type, such as a ryokan-inn (a traditional Japanese-style inn), resort hotel, business hotel, and city hotel. Fourth, unlike studies using monetary trade value data, this study avoids the problem of currency conversion, because number of guests quantifies the real output of the accommodation industry.

This study’s major findings are as follows: First, although geographical distance has a large negative effect on tourist flows, the quantitative magnitude of these effects differs little between foreign tourists visiting Japan and domestic interregional tourists, and the effect of distance on tourist flows is smaller than that on goods trade; Second, the border effect on tourist flows is large, with the number of foreign tourists being more than 60% smaller than that of domestic ones (after accounting for geographical distance); Third, the impacts of distance and border differ by the type of accommodation facility, for example, the effect of distance is larger for ryokan-inns and smaller for city hotels.

The rest of this paper is structured as follows: Section 2 briefly reviews the literature and describes the contribution of this study; Section 3 explains the data used in this study and the method of analysis; Section 4 reports results of the empirical analysis; and Section 5 provides a conclusion.

2. Literature Review

Many studies have applied gravity model to analyze the impacts of distance and national borders on trade flows in goods. Anderson (2011) and Head and Mayer (2014) are the most recent surveys on the gravity model. Regarding the effects of distance on trade flows, Disdier and Head (2008) presented a meta-regression analysis for a large number of past studies, in which the mean and median elasticities of international trade with respect to distance are both about −0.9. This implies that doubling the distance between two countries nearly halves (a 46% decline) bilateral trade amounts. However, studies by Yotov (2012) and Borchert and Yotov (2017) using data covering both international and domestic interregional transactions, have indicated that the impact of distance on goods trade has been declining.

The border effect—the negative impacts of national borders, after accounting for distance—also has been actively studied. McCallum's (1995) pioneering study, which used regional trade data for Canada and the United States, indicates a huge border effect. This "border puzzle" has attracted attention from several researchers (e.g., Anderson and van Wincoop, 2003; Chen, 2004; De Sousa *et al*., 2012; Lavallee and Vicard, 2013).[1] According to Anderson and van Wincoop's (2003) representative study, national borders reduce international trade by 20%‐50%.[2] It should be noted that the border effect cannot be estimated without trade data covering both international and domestic interregional transactions.

Traditional gravity equations generally use trade amounts as the dependent variable, and the size of origin and destination countries (usually GDP) and bilateral distances as baseline explanatory variables (all expressed as logarithms). However, to take general equilibrium effects into account, including indirect, third-country effects ("multilateral resistance"), econometric specification using fixed-effects of both origin and destination countries has become prevalent in

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[1] Okubo (2004) empirically studies Japan's border effect. Using input-output tables for eight regional blocks, he pointed out declining border effects between 1960 and 1990.

[2] In addition to studies using trade data, several studies analyze border effects by focusing on international price dispersion (e.g., Engel and Rogers, 1996, 2001; Gorodnichenko and Tesar, 2009).

recent studies, at least since Anderson and van Wincoop's pioneering study (2003). Santos Silva and Tenreyro (2006, 2011) point out that, with heteroscedasticity and a large number of no trade between two countries, log-linear specification of the gravity model, estimated by OLS, produces a biased result for the estimated coefficient of distance. Since then, Poisson pseudo-maximum likelihood (PPML) estimations, without transforming trade amounts to logarithms, have become more popular. In its gravity model estimation, this study has taken these developments into account.

Contrary to goods trade, studies applying gravity models to services trade have lagged, principally due to data limitations. However, the situation is changing gradually. Early examples include Kimura and Lee's (2006) study of 10 OECD countries, and the study by Head *et al*. (2009) of 32 countries. However, these studies have only used international services trade data. A comparison of domestic and international services trade is not incorporated. Anderson *et al*. (2014, 2015) are rare studies covering both international and intranational services transactions, where intranational and interregional services trading is calculated as the difference between domestic production and international trade. They conclude that while border barriers to services trading have fallen over time, large differences remain across services and countries.

Application of the gravity model is not limited to goods or services trading. Recent studies have frequently used the gravity model to analyze immigration and regional migrations (e.g., Ortega and Peri, 2009; Beine *et al*., 2011; Miguelez and Moreno, 2014; Artuc *et al*., 2015; Orefice, 2015). Beine *et al*. (2016) present survey of the literature on the gravity model applied to migration.[3] Several other studies have applied this methodology to an analysis of tourist flows (e.g., Neiman and Swagel, 2009; Andersen and Dalgaard, 2011; Culiuc, 2014; Westmore, 2015; Urasawa and Kasahara, 2017). Tanaka (2013) applies gravity model to foreign tourist flows into Japan.

Past studies on immigration and tourist flows have estimated gravity models only for international flows, generally excluding intranational flows.[4] This exclusion resulted from a lack of data about domestic, interregional movements that are consistent with international flows.

This study contributes to the literature on tourist flows by using accommodation facility data covering both international and interregional tourist flows obtained from the Japanese government and presents new findings about the quantitative impacts of distance and national borders on tourist flows.

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[3] Some studies incorporate gravity models to analyze commuting and consumers' mobility. For example, Ahlfeldt *et al*. (2015) studied commuting flows in Germany and Agarwal *et al*. (2017) documented the geography of consumption in the United States.

[4] Miguelez and Moreno (2014), who analyzed the determinants of inventors' geographical mobility, applied a gravity model about immigration to mobility across regions in 17 European countries. However, they did not focus on the difference between international and intranational movements.

3. Data and Method of Analysis

3.1. Data

This study uses facility-level microdata of the Accommodation Survey, obtained from the Japan Tourism Agency. The aggregate data published by the survey are used by Tanaka (2013) and Morikawa (2016). Tanaka (2013) analyzes foreign tourists visiting Japan, while Morikawa (2016) considers the impact of foreign tourists on productivity in the accommodation industry. Recently, Morikawa (2017) uses this survey's facility-level microdata to estimate a production function for accommodation facilities.

The Accommodation Survey is a set of monthly statistics, started in 2007, that tracks actual accommodation conditions throughout Japan. It provides basic data for tourism policy planning. The number of observations of each month exceeds 10,000. For small facilities, the survey uses a sampling survey rather than a census. Specifically, it samples one-third of all facilities with five to nine employees and one-ninth of all facilities with fewer than five employees.

The survey items include type of facility (ryokan-inn, resort hotel, business hotel, city hotel, and others), number of rooms, capacity (maximum number of guests), number of employees, total number of guest nights, total foreigner guest nights, and number of guestrooms used. Foreign guests are defined as "guests who do not maintain a residence in Japan," meaning that non-Japanese workers and foreign students residing in Japan are not classified as foreign guests.

Survey questionnaires are divided into three types, depending on the size of the accommodation facilities. For large facilities with 100 or more employees, the number of domestic guest nights by residential prefecture (47 prefectures) and the number of foreigner guest nights by countries of origin are surveyed. Beginning with the April 2015 survey, foreign guests' countries of origin are classified into 20 countries and the rest of the world (ROW).[5] The number of domestic guest nights by residential prefecture is not included in the survey for mid-sized facilities with 10–99 employees and for small-sized facilities with fewer than 10 employees.[6]

In this study, the monthly facility-level data from the Accommodation Survey is aggregated into yearly data to avoid the confounding effects of seasonal fluctuations. In the following analysis

[5] Until 2012, foreigner guest nights were classified into 15 countries and the ROW. In the 2013 surveys, Indonesia, Vietnam, and the Philippines were splitted from the ROW, and in the April 2015 survey, Italy and Spain also were splitted from the ROW.
[6] The number of foreigner guest nights by country of origin is not surveyed for small-seized accommodation facilities.

we mainly use fiscal year 2015 data (from April 2015 to March 2016). We limit sample facilities to large ones where both domestic and foreigner guest nights by prefecture and country are available. The number of facilities totals 830 and the breakout by facility type is as follows: 203 ryokan-inns; 209 resort hotels; 48 business hotels; and 360 city hotels.[7] The tourist flow matrix consists of 67 places of origin (47 prefectures and 20 countries), multiplied by 47 destinations (prefectures).[8] Consequently, the maximum number of observations is 55,610 (830 times 67).

3.2. Method of Analysis

We estimate gravity models at the facility level. We do not aggregate data to regions (prefectures) to estimate a standard, regional-level gravity model, because the study's data is limited to large facilities, which do not cover all facilities in the regions. Another reason is that we could include facility fixed-effects, which enabled us to control facilities' heterogeneity in the same region.

Since there are a non-negligible number of "zero" observations, following the studies by Santos Silva and Tenreyro (2006, 2011), we employ PPML estimators without converting the dependent variable (guest nights) into a logarithm. For the 2015 dataset, the number of observations with zero guest nights total 9,726 (17.5%) of total observations.

The distance of a domestic bilateral prefecture pair is taken from the Geospatial Information Authority of Japan's (GSI) published data. The distance between Japan and foreign countries is taken from the CEPII GeoDist Database.[9] In this study, we define the distance of travelled by foreign guests as the sum of the distance from the country of origin to Japan, plus the distance from the prefecture (where the facilities are located) to Tokyo. As detailed information about visitors' specific routes is unavailable, this calculation assumes that foreign tourists visit Japanese prefectures via Tokyo. This assumption is unlikely to affect estimation results, because the distances from foreign countries to Japan are considerably longer than the distances inside Japan. Specifically, the mean distance between the 20 countries of origin and Japan is 6,191 kilometers, and the mean distance between prefecture pairs in Japan is 509 kilometers.[10]

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[7] The remaining 10 facilities are classified as other types of facilities.

[8] The accommodation survey does not have information about the outflow of the tourists from Japan to other countries.

[9] The distance between bilateral prefecture pairs in the GSI data is the distance between prefectural capitals. The distance between country pairs in the GeoDist Database is the distance between the countries' population-weighted centers.

[10] One exception is Korea. The distance between Korea and Japan is 952 kilometers. Considering the possible bias caused by this outlier, we make our estimations by dropping guests from Korea for a robustness check. Estimated distance coefficients are quantitatively unchanged.

Guest nights of domestic tourists include traveling to accommodations in the same prefecture In this case, as recommended by Mayer and Zignago (2011), we calculate visitors' mean travel distance in a prefecture as 0.67 times $(\text{square km}/\pi)^{0.5}$. In this formula, the respective distances in Tokyo, Osaka, and Hokkaido prefectures are 17.3, 16.5, and 109.2 kilometers. The mean of the 47 prefectures is 30.4 kilometers.

Considering recent developments in the gravity model, we employ the PPML estimator with origin and destination fixed-effects as its baseline specifications. In this estimation, the other explanatory variable is the distance between the origin-destination (facility) pair, expressed as a logarithm (lnDistance). The subscripts o and i denote origin and facility, respectively. As explained in the previous section, this specification has a theoretically desirable property relative to the traditional one. The equation to be estimated is expressed as follows:

$$X_{io} = \exp(\alpha + \beta \ln(\mathrm{DISTANCE})_{io} + \gamma_o + \gamma_i) + \varepsilon_{io} \quad (1)$$

X_{io} is a facility's annual number of guest nights (i) by origin and (o) by number of guests. γ_o, γ_i are, respectively, the fixed-effects of countries or prefectures of origin and those of facilities.

We estimate the gravity equation for all types of facilities and for the subsamples of ryokan-inns, resort hotels, business hotels, and city hotels, to observe differences by facility type. This specification does not include a border dummy and other explanatory variables common across countries of origin (Head and Mayer, 2014). We estimate this equation for the subsample of domestic guest nights to compare the coefficients for distance. Our interest is on whether the effect of geographical distance is larger for foreign tourists than for domestic, interregional ones.

To capture the border effect directly, we also estimate a traditional gravity model (Equation (2) below). In this alternative specification, we replace the origin and destination (facility) fixed-effects by GDPs of origin and destination (GDP_o, GDP_d), and accommodating capacity (maximum number of guests) of a facility ($CAPACITY_i$), both expressed as logarithms. Distance ($\ln(DISTANCE_{io})$) and a border dummy (BORDER) are included as explanatory variables. Facility type dummies ($TYPE_i$) are added when estimations are made for all facilities.

$$X_{io} = \exp(\alpha + \beta_1 \ln(\mathrm{DISTANCE}_{io}) + \beta_2\, \mathrm{BORDER} + \beta_3 \ln(\mathrm{GDP}_o) + \beta_4 \ln(\mathrm{GDP}_d) + \beta_5 \ln(\mathrm{CAPACITY}_i) + \Sigma\beta_T\, \mathrm{TYPE}_i)) + \varepsilon_{io} \quad (2)$$

GDPs of countries are taken from the CEPII database. For consistency, GDPs of Japanese prefectures are calculated as the Japanese GDP in the CEPII database, divided by the prefectures' GDP share, taken from Prefecture Accounts (Cabinet Office). While common language and contiguity of country pairs are the variables most frequently used in traditional gravity models, these variables are unnecessary for Japan because it is an island country without any country sharing the common language.

Major variables and summary statistics are presented in **Table 2**. Since the sample is limited to large accommodation facilities, the ratio of foreigner guest nights is relatively high: mean and median figures are 16.5% and 9.4%, respectively. By type of facility, mean ratios are 7.3% (ryokan-inns), 14.2% (resort hotels), 15.3% (business hotels), and 23.3% (city hotels). Even in large accommodation facilities, the presence of foreign tourists differs by facility type.

In addition to baseline gravity estimations for fiscal year 2015, we conduct the same estimations for fiscal years 2013 and 2014 to observe changes in recent years. In these cases, the number of origin countries is reduced from 20 to 18 countries. For comparison purposes, we re-estimate the gravity models for fiscal year 2015 by dropping two countries from our estimation (Italy and Spain).

4. Results

4.1. Fixed Effects Gravity Model Estimation

Table 3 reports the coefficients for distance estimated from the baseline gravity equation, including origin and destination (facility) fixed-effects (equation (1)). The coefficient is −0.57 for all facilities (Column (1)), meaning that doubling the distance reduces the number of guests from a country or prefecture by 33%. When limiting the sample to domestic guests, the coefficient is −0.66 (Column (2)), which is somewhat larger than that for all guests. However, the difference is quantitatively small. Doubling the distance between origin and destination prefectures reduces the number of guests by 37%.[11] This means that although foreign tourists are affected more by their long distance from Japan, the quantitative impact of the same distance on foreign tourist flows is similar to that on domestic tourists. If the number of foreign guests is smaller than the number of domestic tourists, factors other than distance, such as immigration procedures, the language barrier, and time differences may be the causes.

According to the meta-regression analyses of Disdier and Head (2008) and Head and Mayer (2014), the mean coefficients for distance in goods trade are −0.91 and −0.93, respectively. Therefore, the estimated coefficient for distance in tourist flows is smaller than in past studies on goods trade. Furthermore, the coefficient is smaller than the figure for accommodation services

[11] When limiting the sample to foreign guests, meaningful results cannot be obtained due to a strong multicollinearity between the distance to Japan and the country fixed-effects.

reported by Anderson *et al*. (2014) estimated from data about services trade between Canada and the United States. It is close to the figure for travel services in OECD countries reported by Anderson *et al*. (2015). The possible reason behind the relatively small distance effects in tourist flows is because visiting distant places is itself the purpose of travel.

Columns (2) to (5) in **Table 3** present results for the subsamples by type of accommodation facility. While the coefficients for distance are all negative and significant at the 1% level, the size of the coefficients differs by facility type. The coefficient is the largest for ryokan-inns (−1.33) and the smallest for city hotels (−0.36). The coefficients for resort hotels and business hotels are between −0.63 and −0.55, respectively. The different impacts of distance may reflect characteristics of guests. Principal customers of ryokan-inns and resort hotels are tourists who are visiting for sightseeing and other recreational activities. By contrast, the majority of visitors to business and city hotels stay there for business purposes.

The Accommodation Survey collects information on guests by purpose of visit: (1) sightseeing and leisure; or (2) business. Using this information, we calculate the average ratio of business guests by facility type, which totaled 34.4% in all facilities. The figures are 9.5% in ryokan-inns, 11.8% in resort hotels, 71.4% in business hotels, and 56.2% in city hotels. These figures support the interpretation presented above.

The distance coefficients for 2013 to 2015 are reported in **Appendix Table A1**. To ensure comparability for different years, estimations for fiscal 2015 are revised by dropping Italy and Spain. While coefficients' sizes decline by small amounts during these three years for all facilities, movements differ by type of facility. A substantial decline in the impact of distance does not occur during this three-year period.

4.2. Border Effects: A Traditional Gravity Model Estimation

Table 4 reports estimation results of a traditional gravity model (equation (2)). The coefficient for distance is about −0.60 for all facilities (Column [1]), similar to the result obtained from equation (1), reported in **Table 3**. By type of facility (Columns [2] to [5]), the coefficient for distance is smallest in ryokan-inns and largest in city hotels, which is same as the result reported in the previous subsection.[12]

Although it is not possible to compare the impact of distance precisely with past studies on international tourist flows because of differences in the period of analysis, country coverage, and

[12] When adding an interaction term of distance and the ratio of business guests as explanatory variable, the coefficient for the interaction term is positive and highly significant. This means that facilities with large numbers of business clients attract guests from longer distances, even for the same facility type.

econometric specifications, this study's results are close to Tanaka's (2013) PPML estimation result, which uses aggregate data about foreign guests in Japan in 2009 and estimates the distance coefficient at about −0.7. Urasawa and Kasahara (2017) report a larger distance coefficient (about −1.1) for a panel of 26 countries, from 2008 to 2014. However, when we re-estimate the equation by limiting the sample to foreigner guest nights (not reported in the table), the coefficient for distance is −1.1, which is similar to the result of Urasawa and Kasahara (2017).

Since this specification does not use origin and destination fixed-effects, a dummy for national borders can be included as an explanatory variable. According to the result for all facilities, the coefficient for the border dummy is −1.01, meaning that the number of foreign guests is about 64% less than domestic guests, after controlling for distance and other gravity variables. By type of facility, border effects are largest in resort hotels (−0.170), and, somewhat unexpectedly, smallest in ryokan-inns (−0.57).

Anderson and van Wincoop (2003) and Evans (2003) estimated border coefficients for internationally traded goods as −2.2 and −3.1, respectively. A study by Okubo (2004) on Japanese internationally traded goods estimated a border coefficient of −1.2 in 1990. Although the result is not fully comparable with past studies, the negative effect found in this study of a national border on tourist inflows to Japan is not larger than that on goods trade. Anderson *et al*. (2014) estimated the border effect for accommodation services in Canada and the United States to be about −2, which is larger than the results of this study. Considering that Japan is an island with a distinct language, this smaller border effect is surprising. After accounting for the effects of distance and other factors affecting tourist flows, the number of foreign tourists visiting Japan is, at least in recent years, is not smaller than the international standard.

Appendix Table A2 compares border dummy coefficients. As in the **Appendix Table A1**, estimations for fiscal year 2015 are revised by dropping Italy and Spain to ensure comparability with other years. With the exception of business hotels, negative coefficients of a national border have decreased over time. Because the number of foreign tourists in Japan is increasing rapidly, the decreasing border effect itself is not surprising. According to all facilities' results, after controlling for the other factors including distance, the negative border effect, expressed in percentage terms drops from −79% in 2013 to −62% in 2015. This is quantitatively non-negligible. As observed earlier, since the effect of distance has not drastically changed, the border effect is becoming smaller, in spite of the stable distance effect.

5. Conclusion

This study, using official statistics about accommodation facilities in Japan on the number of guests from foreign countries and domestic regions, adopts gravity models to analyze the effects of geographical distance and national borders on tourist flows. The study's novelty is its use of comparable data, both for international and domestic interregional tourist flows.

First, according to our analysis, while geographical distance has a large negative impact on tourist flows, the quantitative magnitude of this effect is not much different between foreign and domestic, interregional tourists. Distance affects tourist flows less than goods trade. Second, after accounting for geographical distance, the border effect on tourist flows is large; the number of foreign tourists is more than 60% smaller than the number of domestic ones. However, compared with past studies regarding international trade in goods and services, the border effect is relatively small. Third, the impacts of distance and border differ by type of accommodation facility. For example, the effect of distance is larger for ryokan-inns but smaller for city hotels. This difference likely is caused by type of guest, particularly whether his/her purpose is leisure or business. The result that national borders have a negative effect on the inflow of foreign visitors to Japan suggests that policies to mitigate border barriers may contribute to increasing the number of foreign tourists.

This study covers only large accommodation facilities with 100 employees or more, which excludes a large number of small- and medium-sized facilities. It is a limitation of this study.

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Table 1. Number of Visitors to Japan from Foreign Countries, by Origin (thousands).

	Total	Asia	Europe	North America	Oceania	Other
2010	8,611	6,528	853	906	261	63
2011	6,219	4,724	569	685	189	52
2012	8,358	6,388	776	876	242	76
2013	10,364	8,116	904	982	285	77
2014	13,413	10,819	1,049	1,112	347	86
2015	19,737	16,646	1,245	1,311	429	107
2016	24,040	20,429	1,422	1,570	506	113
Annual growth	18.7%	20.9%	8.9%	9.6%	11.7%	10.3%

Source: Japan National Tourism Organization.

Table 2. Major Variables and Summary Statistics.

	Mean	Std. Dev.	Median	Min	Max
Total number of guest-nights	102,360	120,217	70,956	102	1,449,800
ln(DISTANCE)	6.754	1.495	6.553221	2.351	9.412
$\ln(GDP_o)$	25.660	1.683	24.990	23.380	30.521
$\ln(GDP_d)$	25.313	0.981	25.113	23.380	27.357
ln(CAPACITY)	6.009	0.833	3.574	2.303	8.768
Ratio of foreign guest-nights	0.165	0.186	0.094	0.000	0.999

Table 3. Estimated Coefficients for Distance.

	(1) All guests	(2) Domestic guests
All facilities	-0.5689 ***	-0.6584 ***
	(0.0296)	(0.0327)
Ryokan-inn	-1.3272 ***	-1.3414 ***
	(0.0658)	(0.0397)
Resort hotel	-0.6268 ***	-0.6501 ***
	(0.0705)	(0.0782)
Business hotel	-0.5534 ***	-0.6032 ***
	(0.1015)	(0.0908)
City hotel	-0.3595 ***	-0.4486 ***
	(0.0285)	(0.0300)

Notes: PPML estimation results with robust standard errors in parentheses. *** indicates statistical significance at the 1% level. Explanatory variables include origin (country and prefecture) and destination fixed-effects. Distance is expressed as a logarithm.

Table 4. Estimation Results for a Traditional Gravity Equation.

	(1) All		(2) Ryokan-inn		(3) Resort hotel		(4) Business hotel		(5) City hotel	
ln(DISTNACE)	-0.5962	***	-1.0675	***	-0.6266	***	-0.5542	***	-0.4790	***
	(0.0143)		(0.0287)		(0.0270)		(0.0705)		(0.0201)	
BORDER	-1.0071	***	-0.5700	**	-1.6972	***	-0.9405	**	-0.8511	***
	(0.1072)		(0.2394)		(0.2101)		(0.4734)		(0.1515)	
$\ln(GDP_o)$	0.7516	***	0.7622	***	0.8157	***	0.7269	***	0.7517	***
	(0.0161)		(0.0328)		(0.0284)		(0.0689)		(0.0241)	
$\ln(GDP_d)$	-0.1026	***	-0.1419	**	-0.0866	**	-0.1559	***	-0.0641	***
	(0.0147)		(0.0576)		(0.0346)		(0.0510)		(0.0178)	
ln(CAPACITY)	0.9882	***	1.1454	***	1.0914	***	1.0056	***	0.9633	***
	(0.0203)		(0.0807)		(0.0364)		(0.0932)		(0.0302)	
Type dummies	yes		no		no		no		no	
Nobs.	55,610		13,601		14,003		3,216		24,120	
Pseudo R^2	0.5584		0.6325		0.5680		0.5146		0.5913	

Notes: PPML estimation results with robust standard errors in parentheses. *** and ** indicate statistical significance at the 1% and 5% levels, respectively.

Appendix Tables

Table A1. Estimated Coefficients for Distance, 2013–2015.

	(1) 2013	(2) 2014	(3) 2015
All facilities	-0.5908 ***	-0.5817 ***	-0.5712 ***
	(0.0284)	(0.0279)	(0.0296)
Ryokan-inn	-1.3965 ***	-1.4036 ***	-1.3285 ***
	(0.0438)	(0.0503)	(0.0653)
Resort hotel	-0.6344 ***	-0.6224 ***	-0.6277 ***
	(0.0683)	(0.0686)	(0.0705)
Business hotel	-0.5385 ***	-0.5054 ***	-0.5542 ***
	(0.0943)	(0.1062)	(0.1012)
City hotel	-0.3864 ***	-0.3779 ***	-0.3619 ***
	(0.0278)	(0.0272)	(0.0285)

Notes: PPML estimation results with robust standard errors in parentheses. *** indicates statistical significance at the 1% level. Explanatory variables include origin (country and prefecture) and destination fixed-effects. Distance is expressed as a logarithm. To make an appropriate comparison, the 2015 estimation drops Italy and Spain.

Table A2. Estimated Border Coefficients, 2013–2015.

	(1) 2013	(2) 2014	(3) 2015
All facilities	-1.5531 ***	-1.2999 ***	-0.9635 ***
	(0.1085)	(0.1130)	(0.1066)
Ryokan-inn	-1.1222 ***	-0.6078 **	-0.5405 **
	(0.2609)	(0.2610)	(0.2394)
Resort hotel	-2.4807 ***	-2.2758 ***	-1.6449 ***
	(0.2051)	(0.2230)	(0.2097)
Business hotel	-1.2980 **	-0.5826	-0.8959 *
	(0.5436)	(0.5575)	(0.4681)
City hotel	-1.4795 ***	-1.2237 ***	-0.8054 ***
	(0.1575)	(0.1599)	(0.1501)

Notes: PPML estimation results with robust standard errors in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. To make an appropriate comparison, the 2015 estimation drops Italy and Spain.